

REMARKS

The examiner has rejected claims 1-12 under 35 U.S.C. §112 as being indefinite for the reasons set forth on pages 2 and 3 of the Office Action. Each of the bases for indefiniteness will be discussed in the order presented.

The examiner deems the term "protective" to be vague and indefinite. However, this term is discussed on page 4, lines 5-7 of the specification in the context of the protection of electrode surfaces from corrosion. As claims are to be interpreted in light of the disclosure, this description in the specification as one example of "protection" is sufficient enablement for use of this term in the claims.

The lack of Markush terminology is also given as a basis for indefiniteness. The examiner is requested to point out where in the statute, regulations, or Manual of Patent Examining Procedure (MPEP) the use of such terminology is deemed mandatory.

The examiner also questions use of the term "deactivated." This is a term of art in the field of catalytic activity, and means that the catalyst loses its activity over time. As evidence of common usage, attached is page 537 of Levenspiel, CHEMICAL REACTION ENGINEERING, 2nd Ed. 1972, John Wiley & Sons, Inc. Levenspiel devotes an entire chapter to "Deactivating Catalysts." If the examiner remains confused by applicants' terminology, she is encouraged to call the undersigned attorney.

Claims 10 and 11 are deemed indefinite as to the meaning of the last four words of the claims. The claims have been amended to delete this phrase.

Claim 8 has been cancelled thereby obviating the indefiniteness rejection of this claim.

The examiner's confusion with the term "a conductive electrode substrate" is not understood. The specification is very clear that the coating is either electrocatalytic or protective, that is, the coating functions as a catalyst for an electrochemical reaction or to protect the electrode substrate. Either way, the electrode substrate is conductive and functions as the actual electrode.

Turning to the rejections on the merits, claim 12 is rejected as anticipated by Tanaka et al '280. This document, as well as Tanaka et al '279, fails to anticipate or render obvious the claimed invention. Both Tanaka et al documents relate to forming an electrode with a liquid on a base plate. There is no teaching in either reference of applying an electrocatalytic or protective coating on a conductive electrode substrate, as claimed by applicants. It is also noted that at least the abstract of Tanaka et al '280 does not mention use of NIR.

As to the "inherent" electrolytic coating of the Tanaka et al references, the burden is on the examiner to establish inherency. What is her basis for inherency in light of the failure of either reference to teach a conductive electrode substrate? Furthermore, a feature as important as catalytic activity would surely be mentioned at least in passing by the skilled artisan, especially in the field of electrode manufacture. An omission of such magnitude requires at the very least a more detailed explanation by the examiner as to why she believes the references inherently teach this feature with certainty.

Claims 1, 2, 5, 8, 9, and 12 stand rejected as being anticipated by Sakai et al. Applicants respectfully disagree. Sakai et al relates to the repair of a metallic pattern on a substrate. The electrode is typically indium tin oxide (ITO), used in liquid crystal display devices. There is no teaching of applying an electrocatalytic or protective coating onto a conductive

electrode. See in particular Fig. 1c of Sakai et al and paragraph [0059]. In Sakai et al, the metallic thin film 1a coats the upper surface of the glass substrate 2 rather than the upper surface of the electrode 3. Furthermore, there is no mention of electrocatalytic function in Sakai et al, and the burden again rests with the examiner to establish that the inherency of an electrocatalytic is certain.

The rejection of claims 4, 6 and 7 as being obvious over Sakai et al is equally deficient. The examiner suggest that other noble metal compounds besides gold paste could be used. However, she gives no basis for an inherent functionality of such metal compounds in the context of the Sakai et al teaching, viz., for the repair of liquid crystal displays.

Likewise, the addition of Nishiki et al to Sakai et al does not establish a prima facie case of obviousness of Claim 3. Regardless of any teaching in Nishiki et al of coating electrodes with specific metals in multiple layers, how does the examiner reconcile a teaching of repairing defective liquid crystal displays using gold paste (Sakai et al) with the electrolysis of a sodium chloride aqueous solution (Nishiki et al)? Only in hindsight could any connection be made between these two disparate teachings.

Finally, the examiner rejects claims 1-12 as being obvious over Flicstein et al in view of Nishiki et al or Busse et al. Again, the examiner fails to establish a prima facie case of obviousness. The examiner readily admits that Flicstein et al fails to teach applicants' claimed conductive electrode substrate configuration but alleges nonetheless that this configuration is "inclusive" in the Flicstein et al disclosure.

Again, the examiner seems to infer that an element of the claimed invention is inherently taught, but fails to provide a basis

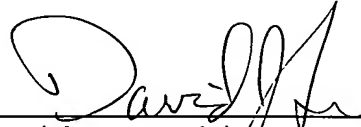
for the alleged inherency. The threshold for establishing inherency is even higher for obviousness than for anticipation, particularly if inherency is the basis for combining the references in the first instance. If the inherent feature is not known, however, there can be no obviousness. In re Spormann, 150 USPQ 449 (CCPA, 1967).

In view of the above, the examiner has failed to establish either anticipation or a prima facie case of obviousness, and a Notice of Allowance is therefore requested.

The Commissioner is hereby authorized to charge any required fees associated with this communication and during the pendency of the application under 37 CFR 1.16 and 37 CFR 1.17 or to credit any overpayment to Deposit Account No. 501348. This sheet is submitted in duplicate.

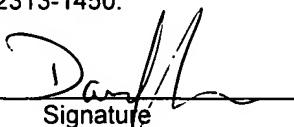
Respectfully submitted,

23 Feb 2004
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CHEMICAL REACTION ENGINEERING

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pilot plant reactor of Example 6 conversion is 71.5%. How much catalyst is needed to raise the conversion to that obtainable in the reactor assuming that the effective bubble size remains unchanged.

6 What fraction of the conversion takes place within the reactor if the remaining resistance to reaction is due to bubble-size effects?

7 The deactivation rate constant is 100 times as large as the reaction rate constant. What is the maximum conversion possible?

8 The treatment rate of gas in the fluidized pilot plant reactor of Example 6 is 100 m³/hr. If the gas velocity and the bed height are both doubled. Under these conditions, what is the bubble size estimated to be 17.5 cm. What conversion can be expected?

9 The catalyst is by Rowe and Partridge (1965) in bubbling fluidized beds. The bubble ratio $\alpha \approx 0.25 \sim 0.67$; however, more recent experiments by *et al.* (1970) show that $\alpha \approx 1$. This difference could be due to the fact that the catalysts were used to measure the wake volume and because different catalysts were used.

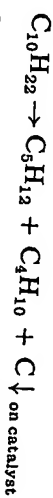
10 The catalyst α has a serious effect on the predicted conversion of reactor. For this repeat Example 6 with $\alpha = 1.02$ instead of 0.25.

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DEACTIVATING CATALYSTS

The previous chapter assumed that the effectiveness of catalysts in promoting reactions remains unchanged with time. Often this is not so, and as a rule the activity decreases as the catalyst is being used. Sometimes this drop is very rapid, in the order of seconds; sometimes it is so slow that regeneration or replacement is needed only after years of use. In any case with deactivating catalysts regeneration or replacement is necessary from time to time.

If deactivation is rapid and caused by a deposition and a physical blocking of the surface this process is often termed *fouling*. Removal of this solid is termed *regeneration*. Carbon deposition during catalytic cracking is a common example of fouling.



If the catalyst surface is slowly modified by chemisorption on the active sites by materials which are not easily removed then the process is frequently called *poisoning*. Restoration of activity, where possible, is called *reactivation*. If the adsorption is *reversible* then a change in operating conditions may be sufficient to reactivate the catalyst. If the adsorption is not reversible then we have *permanent poisoning*. This may require a chemical retreatment of the surface or a complete replacement of the spent catalyst.

Deactivation may also be *uniform* for all sites, or it may be *selective*, in which case the more active sites, those which supply most of the catalyst activity, are preferentially attacked and deactivated.

We will use the term *deactivation* for all types of catalyst decay, both fast and slow; and we will call any material which deposits on the surface to lower its activity a *poison*.